What Is Claimed Is:

1. Apparatus for cutting an aperture in a side wall of a patient's blood vessel comprising:

a tissue-piercing structure having a longitudinal axis and being configured to pierce the side wall by passing through the side wall substantially parallel to the longitudinal axis;

a plurality of resilient structures mounted on the tissue-piercing structure so that they do not substantially increase dimensions of the tissue-piercing structure transverse to the longitudinal axis as the tissue-piercing structure and the resilient structures pass through the side wall, the resilient structures being resiliently biased to spring radially outwardly from the tissue-piercing structure after the tissue-piercing structure and the resilient structures have passed through the side wall; and

a hollow annular tissue-cutter structure disposed annularly around the tissue-piercing structure and configured for movement substantially parallel to the longitudinal axis and for rotation about the longitudinal axis to produce an annular cut through the side wall and to thereby sever from the side wall a disc of tissue that was previously pierced by and that remains impaled on the tissue-piercing structure, the outwardly sprung resilient structures serving to at least help hold the disc on the tissue-piercing structure.

2. The apparatus defined in claim 1 wherein the resilient structures are mounted on the tissue-piercing structure in an array which is annular about the longitudinal axis.

The apparatus defined in claim 1 wherein each resilient structure is mounted on the tissue each resilient structure is mounted on the tissueis
piercing structure so that
piercing structure so that prescring scructure so that the substantially parallel to the resiliently deflectable substantially parallel to the The apparatus defined in claim 1 wherein each resilient structure has a distal portion and a each resilient structure has a upstal portion being closer to an proximal portion, the distal portion that is first to proximal portion the discal portion pelng closer to all portion that is first to end of the tissue-piercing structure that is a series of the tissue-piercing the tiss longitudinal axis. end of the side wall pass through the resident structure pass through the tissue-piercing structure adjacent the tissue-piercing structure adjacent action being secured to the tissue-piercing structure adjacent the tissue-piercing structure adjacent action being secured to and the area the action pering secured to the proximal portion being the distal portion, and the proximal portion, and the proximal portion and the proximal portion. the urstar purction, and the proximal purction werny from resiliently biased to spring radially outwardly from The apparatus defined in claim 1 wherein the tissue-cutter structure is mounted for movement the tissue-piercing structure. relative to the longitudinal original to the constant of the c The apparatus defined in claim 1 wherein parallel to the longitudinal axis. the tissue-cutter structure is rotatable relative to the tissue-piercing structure about the longitudinal The apparatus defined in claim 1 wherein the tissue-cutter structure has a serrated tissue The apparatus defined in claim 1 wherein o. The apparatus uer med in structure is structure is of the tissue-piercing structure is a distal portion of the tissue-piercing structure is axis. cutting edge.

configured to deflect transversely to the longitudinal axis after passing through the side wall.

- 9. The apparatus defined in claim 1 wherein the tissue-cutter structure is configured to cut through the side wall in the same direction that the tissue-piercing structure is configured to pierce through the side wall.
- 10. The apparatus defined in claim 1 wherein the tissue-cutter structure is configured to receive the disc in its hollow.
- 11. The apparatus defined in claim 1 wherein the tissue-cutter structure has a substantially circular tissue cutting edge.